

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-295/93022(DRS); 50-304/93022(DRS)

Docket Nos. 50-295; 50-304

License No. DPR-39; DPR-48

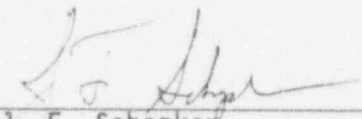
Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Zion Station - Units 1 and 2

Inspection At: Zion Site, Zion, IL

Inspection Conducted: November 2, December 9-10, 1993, and January 13,
February 3-4, March 15-18; 22, 1994

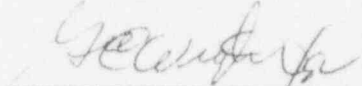
Inspector:


J. F. Schapker

4/18/94
Date

Accompanied By: B. Metrow, IDNS

Approved By:


J. M. Jacobson, Chief
Materials and Processes Section

4/19/94
Date

Inspection Summary

Inspection on November 2, December 9-10, 1993; January 13 and February 3-4, March 15-18; 22, 1994 (Report No. 50-295/93022(DRS); 50-304/93022(DRS))

Areas Inspected: Routine, announced safety inspection of inservice inspection (ISI) activities including review of programs (73051), procedures (73052), observation of work activities (73753), data review (73755), inspection of licensee's corrective action in response to the Unit 2 steam generator tube leak (73753).

Results: Of the areas inspected no violations or deviations were identified. The inspector noted the following:

- The ISI contractors personnel were knowledgeable and utilized state of the art equipment.
- Eddy current examination (ET) of steam generator (SG) tubes for Unit 1, detected some degradation at the roll transition and within the hot leg tubesheet, no degradation was found in the support plate or free span regions as experienced at other units with model 51 steam generators.

- The licensee's steam generator inspection following the tube leak in Unit 2, "D" steam generator was conservative. The licensee performed inspections in the "B" steam generator to assure the degradation was not common to all the steam generators. These inspections exceeded those required by the Technical Specification.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECO)

- # *E. Broccolo, Station Manager
- *M. Lohmann, Site Engineering and Construction Mgr.
- *K. Hausing, Site Quality Verification Director
- *S. Kaplan, Regulatory Assurance Supervisor
- D. Wozniak, Technical Staff Superintendent
- R. Chrzanowski, Regulatory Assurance Supervisor
- # *K. Dickerson, Regulatory Assurance
- # *R. Tolentino, ISI Coordinator
- # *T. Cook, ISI SG Coordinator
- # S. Kaplan, Regulatory Assurance Supervisor
- # M. Rauckhorst, Supervisor Station Engineering
- # B. Whittier, Site Quality Verification

ABB/Combustion Engineering Corporation (ABB/CE)

J. Russel, ET Level III
L. Edwards, ET Level III

Westinghouse Electric Corporation (WE)

J. Halen, Site Supervisor

Dynacon Corporation

J. Hayden, ISI Coordinator
J. Bell, ISI Coordinator

U. S. Nuclear Regulatory Commission (NRC)

- J. Smith, Senior Resident Inspector
- # *P. Lougheed, Resident Inspector

Illinois Department of Nuclear Safety (IDNS)

B. Metrow, IDNS Inspector

Hartford Steam Boiler Inspection and Insurance Company (HSB)

D. Oakley, ANII

The NRC inspector also contacted and interviewed other licensee and contractor employees.

*Denotes those present at the exit interview on February 4, 1994.

#Denotes those contacted for the teleconference exit on April 11, 1994.

2. Review of Previously Identified Inspection Findings (92701)

(Closed) Unresolved Item 50-304/93022-01(DRS) Classification of steam generator (SG) tube eddy current (ET) indications as defective.

The licensee plugs or repairs all SG tube ET indications with confirmed distorted roll indications (DRI's). However the tubes with these indications are not classified as defective as described in the Zion Technical Specifications paragraph 4.3.1.B.4.

The NRC inspector reviewed the licensee's repair and plugging criteria, sampling program criteria and determined that the intent of the Technical Specification requirement was being applied and that safety was not being compromised due to the licensee's classification of the confirmed eddy current indications.

3. Inservice Inspection

a. Program Review (73051)

Personnel from ABB/CE, Ebasco, Dynacon, WE, and CECO performed the ISI in accordance with ASME Code Section XI, 1980 Edition, Winter 1981 Addenda. Where ASME requirements were determined to be impractical, specific relief requests were submitted to the Office of Nuclear Reactor Regulation (NRR) in writing. The NRC inspector reviewed the specific relief requests including the related correspondence between the licensee and the NRC. The NRC inspector reviewed CECO Nuclear Quality Programs Audits and Technical Staff Surveillance of ISI activities. The audit and surveillance activities were implemented in accordance with the licensee's procedural requirements. Overall organizational staffing for the ISI program was found to be acceptable.

b. Procedure Review (73052)

All applicable ISI procedures were approved by the Authorized Nuclear Inservice Inspector (ANII) and were found to be acceptable and in accordance with ASME Sections XI and V, 1980 Edition, Winter 1981 Addenda.

c. Observation of ISI Work Activities (73753)

The NRC inspector observed work activities and had discussions with personnel during the ISI activities. These observations included the following:

- ° Eddy current examination (ET) of the steam generator tubes.
- ° Ultrasonic examination (UT) of the reactor vessel nozzle-to-shell welds nos. 11 and 13 and portions of the upper shell course weld no. 2.

- Ultrasonic examination of Unit 1 SG transition girth welds SG-A weld no. 1-6 * and SG-C weld no. 2-6 utilizing automatic P-scan; and manual UT of Unit 2, SG-C girth weld no. 2-5.
- Magnetic particle examination (MT) (wet fluorescent) of Reactor Vessel Closure Head (RPV) Studs.
- Visual examination (VT) of the Unit one pressurizer vessel interior surfaces.

The inspectors reviewed the qualifications and certifications of all inspection personnel onsite performing ISI to ensure compliance with SNT-TC-1A requirements.

- * Ultrasonic indications which exceeded the Code allowables of ASME Section XI, IWB3511 were evaluated in accordance with the requirements of paragraph IWB3600. The fracture mechanics analyses performed for these indications were reviewed by NRC/NRR. These indications were found acceptable for service without repair per the engineering evaluation. The Code requires augmented examinations of these indications in accordance with IWB3122.4(b). The NRC inspector reviewed documentation applicable to the above engineering analysis and participated in the NRR/licensee telecon discussing these indications on 2/15/94.

d. ISI Data Review (73755)

The inspectors reviewed ISI documents relating to the following:

- NDE data sheets for UT, MT, PT, ET, VT examinations.
- NDE equipment certifications and calibration reports.
- Certification of NDE inspectors.

No violations or deviations were identified.

4. Eddy Current Examination and Repair of the SG Tubes

The licensee employed the services of Combustion Engineering Corporation to perform the ET of the Unit 1 SGs. A multifrequency ET was performed using four data stations in parallel, probing from the hot and cold legs of the SGs. One hundred percent of the tubes in all four SGs were inspected full length for those tubes accessible. The bobbin probe ET was used for the full length examination. Distorted indications (DI) found during the bobbin coil examination were reinspected with the motorized rotating pancake coil (MRPC). All sleeves were inspected with the sleeve crosswound coil probe.

Additional MRPC inspections of 40 tube support plate intersections, 100 of the row two U-bend areas (25 each SG) was performed.

The NRC inspector observed the ET in progress and reviewed the following documents:

- CECo Zion Station Eddy Current Data Guidelines.
- Steam Generator ET report.
- Zion Technical Specifications.
- ET Graphics and Data reports.

ET of the Unit 1 steam generator tubes identified the following:

	<u>SG "A"</u>	<u>SG "B"</u>	<u>SG "C"</u>	<u>SG "D"</u>
DRI	84	100	191	8
DRT	50	18	136	7
DSS	0	0	0	-
NQI	1	31	6	10
0-19%	0	0	0	0
20-39%	95	126	139	153
40%>	0	1	0	0

DRI= Distorted roll indication
 DRT= Distorted roll transition
 DSS= Distorted support plate signal
 NQI= Non-quantifiable indication
 % = thru-wall measurement of indication

The number of indications represent the total indications per SG, and not the number of tubes with indications. (e.g., one tube may have multiple indications. All tubes with confirmed DRI or NQI were plugged or sleeved.

The following SG tube repairs were performed:

<u>SG</u>	<u>Plug</u>	<u>Sleeve</u>
A	15	0
B	6	35
C	7	26
D	13	0

All of the above tubes were plugged with Inconel 690 mechanical or welded plugs or sleeves.

The licensee also replaced 302 Inconel 600 plugs with Inconel 690 mechanical or welded tube plugs.

During the outage the licensee identified two ABB/CE mechanical plugs which dislodged from the SG tubesheet, and one leaking mechanical plug. Each of the defective plugs had been installed as replacement plugs for Westinghouse mechanical plugs (Inconel 600) the previous refueling

outage. Two of the plug failures were attributed to damage (gouges) in the removal process of the Westinghouse plugs, and failure to expand (roll) the ABB/CE mechanical plug in the third failure (this plug was found in the reactor vessel). Further details of the plug failures are documented in NRC report (50-295/93020). The NRC is currently reviewing the generic implications of steam generator plug failures. Information concerning the Zion plug failures was forwarded to NRR for review and inclusion in the generic review.

No violations or deviations were identified.

5. Unit 2 Steam Generator Tube Leak (73753)

The licensee experienced a tube leak during start up of Unit 2 in the 2D steam generator (SG). Unit 2 had operated for 8 months, with a 5 month shutdown for maintenance and modifications not associated with the SGs. No SG inspection (eddy current examination) was performed during the outage for Unit 2. Unit 2 was shutdown and the tube leak was identified (row 17 column 56). The eddy current (ET) examination was performed to locate and characterize the flaw in the SG tube. The examination disclosed an axial indication approximately 2 inches long within an inch of the top of the tubesheet.

The licensee selected a sample of 1500 additional tubes to inspect. This sample was biased to include all the tubes surrounding the flawed tube, and those most likely to experience this type of degradation within the sludge pile region of the "D" SG. Eleven additional tubes within 25 rows of the leaking tube were identified to have axial indications at the top of the tubesheet region of the SG.

The licensee notified the NRC of the tube leak and subsequent inspections throughout the forced outage. Daily communications with NRR and Region III was maintained with reports of findings and planned corrective action.

The licensee expanded the eddy current inspection to include 100% of the "D" SG using bobbin coil and motorized rotating pancake coil (MRPC) examination at the top of the tubesheet region for all accessible tubes. One additional pluggable indication was identified at the periphery of the tubesheet 5 inches from the top of the tubesheet. The number of defective tubes identified in the sample of 1500 did not exceed 1% (12) and therefore no inspection expansion into the other generators was required.

As a conservative measure, the licensee decided to expand the MRPC inspection into the "B" SG. A total of 407 tubes were inspected within the sludge pile region where the indications were detected in the "D" SG. No indications were detected in the "B" SG. In addition the licensee re-reviewed a sample of the 1992 ET inspection data on the A, B, and C steam generators to assure that precursors to these types of indications were not overlooked and that degradation in the upper tubesheet region was not the cause of previous plugging of tubes.

The NRC inspector observed the SG inspection activities, reviewed applicable procedures and verified certifications of the ET analyst.

The NRC inspector observed the SG inspection activities, reviewed applicable procedures and verified certifications of the ET analyst. The NRC inspector also participated in teleconference discussions with the licensee and NRR concerning the inspection issues, root cause determination, and proposed corrective action. The licensee demonstrated conservative inspection action by expansion of the ET using MRPC and bobbin coil in the SG "D". Additional conservatism was shown with inspection expansion into the "B" SG, and re-review of previous data in the other steam generators.

No Violations or deviations were identified.

6. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. An unresolved item disclosed during this inspection is discussed in Paragraph 6.

7. Exit Interview (30703)

The NRC inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on February 4, 1994, and final telecon exit on April 11, 1994, and summarized the scope and findings of the inspection noted in this report. The NRC inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents/processes as proprietary.